The only Ctenostomatous species is represented by one or two imperfect specimens parasitic upon Bugula fruticosa. These, moreover, are so few and so much injured and overgrown by Diatoms, that it is impossible to give an accurate definition of the form, which does not appear to resemble any British species with which I am acquainted, nor does it correspond with Leidy's description and figure of Bowerbankia gracilis. In case it be new, it might be termed Farrella, or, if with a gizzard, perhaps Bowerbankia arctica.

## DESCRIPTION OF PLATE XIII.

- Fig. 1. Bugula fruticosa, Packard. Portion, enlarged 25 diam.
  - 2. Flustra serrulata, n. sp. Forked branch, of nat. size.
  - Another small piece, of natural size.

  - 4. ,, ,, A portion, magnified 25 diam.
    5. Eschara perpusilla, n. sp. A forked branch, magnified 25 diam.
  - 6. Cellepora cervicornis, Busk. Bifurcating branched portion, of natural dimensions.
  - 7. A zoœcium of C. cervicornis, enlarged 50 diam.
  - 8. Zoœcium of same, also magnified 50 diam.
  - 9. Farrella arctica, n. sp. Portion, enlarged 25 diam.

On the Classification of Gasteropoda.—Part II. By John Denis MACDONALD, M.D., F.R.S., Inspector Gen. R.N. (Communicated by G. E. Dobson, M.B., F.L.S.)

## [Read November 18, 1880.]

THE Scutibranchiata, which were in my former system\* incorrectly associated with the diecious Gasteropoda, have been arranged in the above revised Table with the other Gasteropoda Monœcia.

The conscientious naturalist, like the theologian, is always in quest of the truth; and consequently, if he finds that this has been arrived at by one or many workers, it need not be subverted for the pure sake of change, or of presenting a subject in a more novel garb. I have therefore adopted the very natural and simple distribution of the Scutibranchiata given by Dr. Gray in his 'Guide to Mollusca,' carrying out an alteration which he has himself suggested, and the propriety of which has indepen-

<sup>\*</sup> See 'Transactions of the Linnean Society,' vol. xxiii. p. 69 (1860). LINN. JOURN. - ZOOLOGY, VOL. XV. 19

dently occurred to me when studying the Helicinidæ, and comparing them with the true Nerites, both aquatic and marine. I would merely further take the liberty of inverting the order in which Dr. Gray's families are arranged, as being thus disposed more in accordance with the method adopted in classifying other natural groups in the first part of this paper. This will be permitted, I am sure, even by the most conservative, as by doing so no natural affinities will be violated, while we shall have the satisfaction of seeing that Helicina and its congeners are not thrown more widely apart from the other so-called Pulmonifera operculata than can possibly be helped. Raphidoglossa (or needle-beset tongue, as the word implies) is scarcely descriptive enough, or even suggestive of the complex and beautiful structure which it is intended to express; but inasmuch as we have been now sufficiently accustomed to associate the name with the thing signified, it would be unnecessary to alter it. The term Heteroglossa may also be retained as indicative of what may be clearly recognized to be a morphological modification of the primary type (Raphidoglossa).

Dr. Gray saw the necessity of arranging Proserpina and Ceres with the Scutibranchiata, their dentition being raphidoglossal, though it was only possible for him then to append them to what had been already printed. He prepared the suborder Pseudobranchia for their reception. This was a step in the right direction; and doubtless if he had not been misled by some means so as to have supposed the dentition of Helicina to be septiserial instead of raphidoglossal, which it truly is, he would have placed it in the same category with Proserpina and Ceres. There would thus be good reason for removing both the Olygyrade\* and Proserpinidæ from their association with the Cyclophoridæ and Littorinidæ.

If we now take the two orders Heteroglossa and Raphidoglossa, and apply the test of analogy as suggested in the first part of this paper, we shall find a rather interesting result. Thus Cryptochiton in the former group would nearly represent the shelless Deridovranchus in the latter; Patella would be answer-

<sup>\*</sup> Olygyra, Say, is merely a synonym of Helicina, upon which Dr. Gray has founded the family name Olygyradæ, though the generic name of Helicina is retained to the exclusion of Olygyra. In a somewhat similar way the family name Olividæ is preserved, while the generic name Strephona is made to supersede that of Oliva.

able to Scutus or Parmophorus, and Dentalium to Fissurella; while the further progress of shell-development is to be traced through Teinotis, Haliotis, Scissurella, Trochus, Turbo, Nerita, and Neritina, winding up with the pulmoniferous genera Helicina, Proserpina, and Ceres.

If all the genera given by Dr. Gray with *Helicina* as Olygyradæ really exhibit the *raphidoglossal* type of dentition, this group will become of more importance than has hitherto been supposed.

## Classification of the Gasteropoda (continued).

Division II. DIŒCIA (sexes distinct).

Subdivision I. Lingual membrane unarmed, or with pleural teeth only.

Order I. Proboscis lengthy and completely retractile, or shorter and not completely retractile in the aberrant family of *Ianthinidæ*.

(a) Both rachis and pleuræ unarmed Pyramidellidæ and Cancellariidæ. curved\*, simple Pleurotomidæ. (b) Pleuræ represented by a single series of teeth on each side simple ... Acusida. barbed ... Conidæ. Outer teeth with additional Solariidæt. (c) Dentition in the form cusps .... of a double pavement. All the teeth simple and Scalariidæ. uncinate..... [ Ianthinidæ.

Subdivision II. Lingual membrane strap- or ribbon-like.

Order I. PROBOSCIDIFERA. Proboscis lengthy, retractile; ear-sacs with otoliths.

Suborder 1. Orthodonta. Dental processes in general pointing directly backwards from or from near the posterior border of the basal plates.

Lingual dentition uniserial (rachidian) .. Volutidæ. Rachis Strap short ..... Mitridæ. Dental processes and numerous, small. Strap long { teeth short..... teeth long ..... Fasciolariidæ. pleuræ Fusidæ. comb-Dental processes few and large ...... ingual Turbinellide like. ntition Uncinus with an additional internal cusp ..... Buccinida. iserial. Maricida. Pleuræ Uncinus simple. Cusps large and few ...... Olividæ. unci-Rachis armed. Harpadæ. nate. Cusps small and numerous. Turritide. Uncinus foliated. Rachis unarmed ..... Columbellida.

† The ear-sacs in this family alone have otoconia; all the others have single spherical otoliths.

<sup>\*</sup> For figures of the different forms of dentition here referred to see my paper "On the Homologies of the Dental Plates and Teeth of Proposediferous Gasteropoda," in Ann. and Mag. Nat. Hist. 1869, iii. pp. 413-416, pl. xiii.

Suborder 2. Anaclodonta. Cusps recurved from the fore part of the basal plates. Dentition typically septiserial, but in some instances reduced to 5 or 3 rows by suppression,

Velutinidæ. Naticidæ. Tritonidæ Ranellidæ. Doliidæ. Cassididæ.

Strombidæ.

Order II. ROSTRIFERA. Muzzle simple or proboscis rudimentary.

Suborder 1. ORTHODONTA. Cusps direct.

Pelagic. Heteropoda. Marine. Phoridæ.

Suborder 2. Anaclodonta. Cusps recurved.

Cypræidæ. Vermetidæ. Calyptræidæ. Marine and littoral ... \ Planacidæ. Littorinidæ. Rissoidæ. Truncatellidæ. Cerithiidæ. Melaniadæ. Cerithidea. Paludinidæ. Potamidinæ. Valvatidæ. Cyclostomidæ and Cyclophoridæ. their allies. Diplommatinidæ.

All the families in the first column have otoliths in their earsacs; the few on the right have otoconia. This may be significant; but the subject requires further study.

Just as we have found terrestrial, aquatic, and marine Nerites, there is good promise that corresponding groups may be discovered in relation to other types of Anaclodontous Rostrifera with septiserial ribbons, the grouping of which is at present very imperfect. In this research, however, the shell-characters must be subsidiary to the most critical record of the anatomy of well-determined species, so as to afford legitimate grounds for their adoption or rejection as the case may require.

Indeed, from my own experience, I am quite sure that without this test the assumption of the alliance of even one so-called species with another founded on superficial resemblances can only be guesswork, allowable certainly for convenience and provisional a rangement, but it must always be amenable to the dictum of more precise anatomical knowledge.